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### XIII.—AN OBJECTIVE STUDY OF SYLLABIC QUANTITY IN ENGLISH VERSE

#### BLANK VERSE

It is my purpose in this paper to consider the quantity of the syllables in twenty-five lines of Milton's *Paradise Lost*. The selection, given below, was read by three different men. The first is an instructor in vocal expression, the second is a graduate student in language and phonetics, and the third is a professor in the Department of General Linguistics. All three are connected with the University of Michigan.

The instrument into which the readers spoke the lines is one devised by Professor John F. Shepard of the University of Michigan. It consists of various tambours covered with mica and rubber and mounted with pointers which record the vibrations and the outflow of air during speech. The pointers removing the soot from a revolving band of smoked paper, write thus the various vibrations and curves which represent speech; syllables can therefore, in most cases, be accurately measured.<sup>1</sup>

Before considering results a few words must be said about syllabic division. I have followed conventional dictionary division as being on the whole most satisfactory; but the conventional division of syllables and the actual division do not always coincide. Thus *summer*, *ferry*, and other words with double consonants have really but one

<sup>1</sup> A complete description of the instrument, and a detailed reading of two plates is given in my thesis on *Pause, a Study of its Nature and its Rhythmical Function in Verse, Especially Blank Verse*. Edited by Fred Newton Scott in *Contributions to Rhetorical Theory*.

consonant sound: *sum - er, fer - y*. Again, one cannot say in certain words what are the precise limits of syllables. For example, do we say *re - g(i)on* or *reg - (i)on*? Do we say *mom - ent* or *mo - ment*? *e - vil* or *ev - il*? *Gor - go - nian* or *Gor - gon - ian*? And does one syllabify always in the same manner?<sup>2</sup> These doubtful cases are, however, rare; each person can consider them for himself, and can make allowances. A more serious difficulty lies in finding in the records the precise division between syllables that end and others that begin with voiced sounds. These sounds often blend in such a way that no division of sound is perceptible. The end of the nasals *m* and *n* is, however, easily distinguishable, since nose tones are recorded by a special pointer; but *o* and *l*, *e* and *a* are examples of sounds which may blend. It is not necessary to state that the sounds and syllables of continuous discourse are not as exact as writing indicates. The boundaries of syllables, however, which is our concern, are, with the exceptions stated, clearly evident. All doubtful divisions are indicated.

In the material which follows the numbers represent the length of the syllables in tenths and one-hundredths of a second. The numbers in parenthesis are pauses.

*Paradise Lost*, II, ll. 604-628: Readers I, K, and M.

They	fer	-	ry	o <sup>3</sup>	-	ver	this	Le	-	the <sup>3</sup>	-	an	sound	604
.28	.38		.12	.18		.15	.25	.2		.2		.18	.65	
.4	.4		.15	.3		.1	.2	.3		.3		.25	.8	(.4)
.2	.3		.18	.25		.15	.34	.18		.2		.25	.42	(.15)

<sup>2</sup> The problem of syllabification is now under investigation at the University of Michigan. The solution of the difficulties involved will be a very material aid in verse analysis.

<sup>3</sup> Doubtful division.

Both to and fro, their sor-row to aug-ment, 605  
 .46 .2 .2 .6 (.18) .15 .3 .18 .26 .2 .4 (.65)  
 .4 .3 .22 .8 (.25) .4 .5 .18 .2 .4 .45 (.6)  
 .38 .3 .18 .5 (.65) .22 .4 .12 .25 .35 .44 (.55)

And wish and strug-gle, as they pass, to reach 606  
 .2 .4 .2 .32 .25 .12 .2 .42 (.4) .2 .36  
 .2 .5 .3 .4 .3 (.4) .3 .22 .7 (.46) .3 .4  
 .2 .5 .24 .28 .2 .22 .2 .6 (.35) .22 .3

The tempt-ing stream, with one small drop to lose 607  
 .12 .3 .26 .62 (.3) .18 .4 .5 .42 .2 .5  
 .2 .38 .34 .84 (.46) .28 .4 .65 .6 (.18) .3 .4  
 .1 .28 .3 .6 (.55) .25 .32 .44 .4 .12 .5

In sweet for-get-ful-ness all pain and woe, 608  
 .2 .4 .18 .3 .12 .22 (.2) .3 .6 .12 .5 (.58)  
 .2 .4 .2 .3 .2 .28 .48 .6 .2 .62 (.7)  
 .2 3. .2 .24 .18 .25 (.1) .3 .4 .2 .44 (.5)

All in one mo-ment, and so near the brink; 609  
 .4 .2 .12 .4 .25 (.25) .22 .20 .32 .1 .5 (.5)  
 .48 .22 .3 .4 .3 (.5) .35 .35 .44 .12 .7 (.7)  
 .38 .18 .2 .22 .34 (.65) .25 .3 .34 .1 .5 (.28)

But Fate with-stands, and, to<sup>s</sup> op-pose the attempt, 610  
 .22 .4 .3 .58 (.38) .2 .1 .1 .5 .18 .5 (.3)  
 .26 .48 .35 .8 (.6) .25 .25 .15 .55 .3 .6 (.55)  
 .2 .3 .2 .6 (.5) .2 .2 .08 .4 .2 .45 (.14)

Me-du-sa with Gor-go-nian ter-ror guards 611  
 .15 .4 .12 .22 .22 .3 .2 .22 .25 .44  
 .15 .38 .12 .2 .4 .4 .2 .34 .24 .7  
 .14 .2 .2 .2 .28 .2 .3 .28 .14 .4

The ford, and of it-self the wa-ter flies 612  
 .12 .55 (.3) .2 .2 .18 .5 .12 .26 .25 .68  
 .2 .74 (.4) .42 .18 .18 .6 .15 .3 .2 .8  
 .1 .52 (.2) .2 .21 .25 .35 .12 .2 .2 .45

<sup>s</sup> Doubtful division.

All taste of liv<sup>1</sup> - ing weight, as once it fled 613  
 .14 .48 .15 .2 .2 .4 (.4) .2 .4 .14 .4  
 .4 .6 .18 .22 .2 .48 (.5) .4 .46 .14 .6  
 .25 .35 .15 .15 .15 .4 (.6) .28 .3 .2 .3

The lip of Tan - tal - us. Thus rov<sup>1</sup> - ing on 614  
 .14 .35 .12 .28 .1 .32 (.7) .3 .3 .2 .52 (.1)  
 .05 .4 .18 .48 .2 .3 (.82) .45 .6 .22 .62  
 .12 .2 .12 .22 .15 .28 (.9) .28 .3 .15 .38

In con - fused march for - lorn, the ad - ven - turous bands, 615  
 .22 .38 .38 .4 .24 .45 (.4) .2 .32 .22 .6 (.52)  
 .14 .5 .6 .6 .4 .7 (.5) .22 .4 .3 .8 (.6)  
 .22 .32 .44 .44 .3 .48 (.62) .2 .3 .2 .6 (.18)

With shud - dering hor - ror pale, and eyes a - ghast, 616  
 .2 .26 .3 .3 .28 .6 (.15) .18 .4 .08 .54 (.4)  
 .28 .3 .32 .4 .25 .72 (.5) .15 .5 .1 .52 (.7)  
 .2 .32 .2 .24 .2 .6 (.1) .1 .6 .1 .6 (.55)

Viewed first their lam - en - ta - ble lot, and found 617  
 3. .37 .18 .18 .08 .1 .15 .7 (.74) .28 .38  
 .68 .5 .3 .44 .18 .08 .26 .55 (.55) .5 .6  
 .35 .4 .18 .22 .1 .18 .1 .4 (.22) .2 .32

No rest. Through man - y a dark and drear - y vale 618  
 .18 .5 (.3) .3 .25 .18 .12 .52 .2 .4 .18 .38  
 .4 .8 (.65) .4 .26 .18 .1 .55 .2 .4 .2 .75  
 .24 .6 (.7) .26 .2 .1 .1 .55 .18 .44 .1 .45

They passed, and man - y a re - gion dol - o - rous. 619  
 .2 .6 (.3) .12 .28 .12 .15 .28 .26 .25 .15 .32 (.3)  
 .22 .76 (.62) .2 .3 .18 .12 .28 .54 .2 .2 .6 (.8)  
 .18 .68 (.3) .15 .2 .08 .1 .22 .2 .28 .16 .22 (.3)

O'er man - y a froz - en, man - y a fier - y Alp, 620  
 .22 .24 .1 .15 .35 .3 .3 .12 .1 .42 .3 .52 (.3)  
 .2 .25 .15 .18 .45 .34 (.4) .4 .1 .08 .46 .18 .58 (.5)  
 .2 .2 .12 .15 .32 .34 (.3) .15 .1 .1 .5 .08 .5 (.6)

Rocks, caves, lakes, fens, bogs, dens, and shades of death— 621  
 .5 (.3) .6 (.15) .5 (.2) .65 (.2) .5 (.2) .7 (.3) .2 .44 .1 .52 (.55)  
 .8 (.08) .8 .6 .85 (.25) .8 (.1) .65 .22 .65 .15 .7 (.7)  
 .62 .7 .48 .8 (.4) .6 (.07) .6 .24 .5 .18 .5 (.3)

A <sup>1</sup>	u	-	ni	-	verse	of	death,	which	God	by	curse	622			
.15	.22	.07	.34	.12	.48 (.3)	.3	.52	.2	.4	(.1)					
.2	.3	.12	.4	.1	.6 (.6)	.32	.6	.44	.65						
.2	.2	.1	.4	.15	.5 (.6)	.3	.48	.2	.4						
Cre <sup>2</sup> -at-ed	e <sup>3</sup>	-	vil,	for	e <sup>3</sup> -vil <sup>3</sup>	on	-	ly	good;			623			
.18	.24	.12	.3	.2 (.3)	.32	.2	.15	.3	.18	.5 (.6)					
.3	.25	.1	.38	.3 (.32)	.4	.4	.18	.4	.18	.52 (.5)					
.2	.15	.1	.28	.2 (.4)	.2	.24	.15	.2	.18	.5 (.8)					
Where	all	life	dies,	death	lives,	and	Na	-	ture	breeds,		624			
.28	.42	.35	.72 (.2)	.4	.62 (.3)	.15	.35	.12	.42	(.18)					
.4	.44	.6	.85 (.4)	.5	.7 (.4)	.3	.4	.2	.8						
.3	.3	.4	.75 (.2)	.3	.52 (.6)	.18	.29	.18	.4						
Per	-	verse,	all	mon	-	strous,	all	pro	-	dig	-	ious things, 625			
.3	.58 (.3)	.32	.32	.4 (.3)	.3	.2	.22	.2	.6	(.35)					
.4	.5 (.5)	.42	.42	.4 (.1)	.4	.2	.28	.2	.6	(.5)					
.28	.5 (.2)	.26	.3	.42(.1)	.28	.2	.26	.2	.6	(.5)					
A	-	bom	-	i	-	na	-	ble,	in	-	ut	-	ter	-	able, and worse 626
.09	.38	.02	.12	.38	.18	.18	.2	.3 (.3)	.26	.3					
.12	.4	.02	.1	.3 (.25)	.2	.2	.08	.3 (.3)	.3	.54 (.3)					
.15	.25	.1	.08	.48 (.2)	.15	.12	.2	.24 (.6)	.24	.35					
Than	fa	-	bles	yet	have	feigned	or	fear	con	-	ceived				627
.28	.28	.28	.3	.22	.6 (.1)	.32	.4	.2	.52 (.47)						
.25	.3	.35	.35	.2	.68	.35	.52	.25	.62 (.5)						
.26	.32	.18	.18	.2	.46	.2	.32	.4	.8 (.5)						
Gor	-	gons,	and	Hy	-	dras,	and	Chi	-	mae	-	ras	dire.		628
.3	.35 (.1)	.18	.38	.38 (.2)	.18	.2	.26	.28	.6 (.8)						
.5	.5 (.2)	.2	.44	.44 (.3)	.2	.4	.45	.4	.7 (.7)						
.32	.32(.15)	.2	.32	.34 (.1)	.2	.28	.4	.28	.5 (.1)						

For convenience of classification I shall assume to begin with, and modify the statement later, that every foot has one stressed syllable. I regard the stresses as falling on the second syllable except in the case of two trochees standing at the opening of lines 605 and 609. I shall

<sup>2</sup> Doubtful division.

assume that even in so-called spondees the second syllable is slightly more stressed than the first. With these assumptions granted, there would be in twenty-five lines 125 stressed syllables. The percentage of stressed syllables which are longer than the unstressed syllables in the same foot is for the different readers as follows: I, 86%; K, 82%; M, 85%; or an average of 84%. About 8% of the stressed syllables that are not longer than the unstressed are of the same length. Of the remaining 8%, representing cases in which the unstressed syllable is the longer of the two, it should be noted that rarely is the first, or unstressed syllable, more than one-tenth of a second longer than the second syllable of the foot. The average difference in length between unstressed and stressed is .2. It should also be noted as a preliminary observation that rarely for any one of the three readers is there in any given line more than one foot of which it is true that the unstressed syllable is of the same length as the stressed, or longer; this foot never occurs at the end of the line and only infrequently at the beginning of the line.

Let us now examine and classify the anomalous 16%. A very few cases of long syllables in the unstressed position are clearly cases of spondees, but it should be noted that the majority of feet usually regarded as spondees are read with the second syllable longer. Other cases, a fairly large number, occur at points where the actual division was not clear in the records, or where the conventional division may not coincide with the true division.

We shall now consider various forms of a group which have possibly only a very slight stress or none, and may, therefore, be exceptions to the statement that every foot contains a stressed syllable. The first of these are polysyllables. In words of this sort the syllables tend to be

either very short or comparatively so. The stress in these cases is very light. Other cases occur in feet which probably are pyrrhics, that is, have no stressed syllable. An example is *and of*, line 612. Nearly all of the remaining are cases of unstressed syllables standing before the pause within the line. These syllables all readers make as long as the one following the pause, or longer.<sup>4</sup>

In these cases it should be noted that with the possible exceptions of line 620 and line 625, the word or syllable following the pause, is itself a word which is usually found, or often found, in the unstressed position. It is undoubtedly true, as Professor C. W. Cobb has pointed out in his article *Further Study of the Heroic Tetrameter*<sup>5</sup> (*Mod. Phil.*, xiv, pp. 559-67), that many persons read these lines with only four clearly perceptible stresses, as

And wish and struggle, as they pass, to reach,  
All in one moment, and so near the brink;  
Gorgons, and Hydras, and Chimaeras dire.

Another possible explanation is that the pause itself stands for the long syllable, and that the following short syllable is carried over into the next foot.

A few other cases occur in words the stress of which may not have been perfectly clear to the reader, since the word-stress and metrical stress do not fall together. Such words are *Lethean*, line 604; *confused*, line 615; *lamentable*, line 617.

All these classes comprising the 16% of syllables in which it is not true that the stressed syllables are longer

<sup>4</sup>In my investigation of pause, I found that the syllable or word before the pause is usually greatly lengthened.

<sup>5</sup>Other articles dealing with the same subject by Professor Cobb are: "A Type of Four Stress Verse in Shakespeare," *New Shakespeareana*, Jan. 1911; "A Scientific Basis for Metrics," *Modern Language Notes*, xxviii, pp. 142-145.



than the unstressed fall into three general classes: spondees, in which the stress may be equally distributed, and polysyllabic words, in which the same statement may hold true; pyrrhics, or feet made up of syllables neither of which is stressed; and, finally, cases in which error of reading or of division is possible. An exact division, of course, might increase and not decrease the percentage of anomalous cases.

It may be suggested at this point as the most obvious explanation of the 16% of syllables analyzed that stress and quantity do not need necessarily to accompany each other,—that a syllable in the unstressed position may be longer than one in the stressed position. This may be true, but our experiments, as well as those of others, show that syllables stressed even very lightly are longer than the same syllables unstressed. I have asked several readers to make an iambic rhythm of *do do* and of other syllables, as *do le*, *le do*, etc., stressing one more than another. I have no record in which the stressed syllable is not longer than the unstressed. The part which pitch plays in the differentiation of one syllable from another and the relation of this to quantity is a subject upon which I am at present working.

If now we subtract from the 125 syllables which we assumed to be stressed at the outset all syllables the division of which is doubtful, and still assume, since we have no definite data for asserting anything to the contrary, that every syllable in the stressed position is stressed, we have for the three readers, respectively, the following per cent. of stressed syllables found to be the long syllables of the foot: 90%, 89%, and 90%. We can, therefore, safely assert that 90% of all stressed syllables in the selection studied are also longer than the unstressed syllables, and we may

infer, if we choose to believe the evidence before us, that the remaining 10% are cases of feet in which one syllable is not more vigorously stressed than another, and therefore not longer. This 10% furnishes the relief from the monotony of five beats for every line, just as do the so-called spondees, or cases of an extra stress, and together with the cases of extra stress furnished by the spondees yields rhythmical variations and logical flexibility. I have already mentioned the fact that unstressed syllables which are longer than stressed syllables are only slightly longer, usually not more than .1 of a second.

In this connection it would be interesting to know how much longer one syllable must be than another to be subjectively appreciated as such. Certainly difference in pitch would easily differentiate syllables of the same quantity or of the same intensity. Judging from the various experiments made by different persons, I should surmise that in a rhythmic series already clearly established in the mind, the slightest change of pitch, quantity, or stress would satisfy the rhythmic feeling. I am inclined to think that no change or even a very slight increase of any one of these sound elements in favor of the unstressed syllable would not be perceived as cacophonous. As has been repeatedly demonstrated, the metrical pattern once established in the mind, will not be disturbed by a few irregularities. In fact, the rhythm may be momentarily dropped and then regained without difficulty.

In this paper I shall make no attempt to point out reasons for shortness or longness in syllables. The physical content of the syllable is, of course, an element concerned; and likewise, its mental and metrical import. *Ut* of *inutterable* carries very little mental content of itself; *pain* and *woe* carry much. Light, or short syllables, are largely

light because their mental content is light, but these may become at times the most important words in a phrase; as, I have at last found *the* man. It is the element of meaning which makes syllables and words delicately larger or smaller, more or less impressive, as one reads or speaks. It is interesting to note in line 607,

with one small drop to lose  
In sweet forgetfulness all pain and woe.

that all readers make *small* longer than *drop*, although usually it is true in iambic verse that of the long syllables in a spondee the second is longer than the first.

To show how variable in length syllables may be, I will give the lengths of a few words which are repeated in the selection. *And* varies in length from .1 to .5. *To* varies from .2 to .3. *All* varies from .14 to .48. All three words are in both the stressed and unstressed positions.

Of greater interest than the varying lengths of the same word are the varying lengths of the short and long syllables in the foot. The feet, in many cases, are not made of syllables which are absolutely short and long, but of syllables which are relatively so. Nevertheless, it is clear from an examination of the material that in nearly every line there are usually three and often four feet of which it may be said that the stressed syllable is not only long, but approximately twice as long as the unstressed. Below is a table which gives for each reader the average length of the short syllables, range in length, and average length for each foot in the line. The same details are given for the long syllables, together with general averages.<sup>6</sup>

<sup>6</sup> Since there might be a difference of opinion as to how the words in a spondee should be classified, I have omitted these: *small drop*, line 607; *viewed first*, line 617; all of line 18; and *life dies*, *death lives*, line 624.

TABLE I

## a. SHORT SYLLABLE

Reader	Aver. Length	Range	Average 1st ft.	Length of 2nd ft.	Short 3rd ft.	Syllable for 4th ft.	5th ft.
I	.20	.02-.4	.19	.20	.20	.20	.20
K	.25	.02-.54	.25	.25	.25	.26	.24
M	.20	.08-.44	.20	.20	.22	.20	.20
Aver.	.22	.02-.54	.21	.22	.23	.22	.21

## b. LONG SYLLABLE

I	.38	.1 -.8	.38	.33	.32	.37	.49
K	.44	.08-.84	.45	.42	.40	.43	.62
M	.34	.1 -.8	.34	.33	.30	.31	.37
Aver.	.39	.08-.84	.39	.36	.34	.37	.49

The table indicates that although there is a very great variety in the length of both short and long syllables, the average length of the short syllables is approximately .2 and of the long syllable .4, yielding the accepted ratio for classic poetry of 2:4. The average length of the short syllable in the different positions within the line remains approximately the same for each reader. The average length of the long syllable shows for each reader greater length in the fifth foot and also in the first foot,—a fact which is of significance as indicating the organization of the line.

From what has already been said the composition of the foot in English verse is clear. It is made up of syllables 90% of which are, in the stressed position, longer than those in the unstressed. There is the greatest possible variety in the relationship of short to long, but the average length of short to long is approximately as 2:4. Underlying the great diversity there seems to be a norm. Al-

though, as has been said, these facts make the foot composition clear, in order to make the matter more definite I give a table which shows the average length of the foot in this selection, the range in lengths for each reader, and for the material as a whole. In this table the times of all syllables are included.

TABLE II

Reader	Aver. Length of foot	Range	Average 1st ft.	Length of 2nd ft.	Short 3rd ft.	Syllable for 4th ft.	5th ft.
I	.57	.18-1.2	.57	.50	.51	.58	.67
K	.76	.2 -1.6	.76	.74	.70	.73	.88
M	.59	.3 -1.32	.58	.55	.58	.57	.65
Aver.	.64	.18-1.6	.64	.6	.6	.63	.73

Although it is possible for any one interested to find the length of the feet in the material given, I will give the length for each of the three readers for the first five lines, merely to indicate more vividly the time values in verse of this sort.

I	.66	.3	.4	.4	.83	1
K	.8	.45	.3	.6	1.05	
M	.5	.43	.49	.38	.67	
I	.66	.8 (.18)	.45	.44	.6 (.65)	2
K	.7	1.02 (.25)	.9	.38	.85 (.6)	
M	.68	.68 (.65)	.62	.37	.79 (.55)	
I	.6	.52	.37	.62 (.4)	.56	3
K	.7	.7	.6 (.4)	.92 (.46)	.7	
M	.7	.52	.42	.8 (.35)	.52	
I	.42	.88 (.3)	.58	.92	.7	4
K	.58	1.18 (.46)	.68	1.25 (.18)	.7	
M	.38	.9 (.55)	.57	.84	.62	
I	.6	.48	.34 (.2)	.9	.72	5
K	.6	.5	.48	1.08	.82	
M	.6	.44	.43 (.1)	.7	.64	

These units can hardly be said to be even approximately equal in length, since one is frequently twice as long as another and may be three and four times as long. It is interesting to note, however, that at times a reader will keep the feet about the same length, as for example, M, line 1, and K, line 3. Psychologically, as has been demonstrated by experiments with elements mechanical in nature, the ear does not need approximately equal units, but only a certain degree of uniformity. To anyone who listens attentively to the time values of a good reader, the changing time is clearly evident, and this variation adds greatly not only to the logical and emotional character of verse, but also to its artistic power.

ADA L. F. SNELL.